

REMARKS

The Office Action dated June 27, 2008, has been fully considered. The present Response is intended to be a complete response thereto and to place the case in condition for allowance.

Claims 1-14 are pending. Claims 8-14 have been withdrawn by the Examiner.

THE CLAIMS ARE NOT OBVIOUS

Claims 1-7 stand rejected under 35 U.S.C. § 103(a) as being obvious over Baro et al. (U.S. Patent No. 5,082,969) in view of Palmer et al. (U.S. Patent No. 6,252,113). Applicants respectfully traverse the rejection.

First, Baro et al. and Palmer et al., taken alone or in combination fail to disclose every element of the claimed invention. In particular, the references fail to disclose 1) the reaction of 4-(2-methoxyethyl)phenol and epichlorohydrin (step B) at a temperature of 40-45°C; and 2) extracting and washing the organic phase reaction product of step B at a pH of 7.0-8.0.

With regard to the reaction temperature, Baro et al. teach a reaction temperature of 20-25°C (Example 1), while Palmer et al. disclose a reaction temperature at 50-70°C (column 2, lines 42-43; and column 3, Working Example). Therefore, neither reference teaches a reaction temperature of 40-45°C.

Nevertheless, the Examiner alleges that “[o]ne skilled in the art would have been motivated to modify the temperature in order to optimize the process.” *See* Office Action, page 3. Applicants respectfully submit that Baro et al. and Palmer et al. have already optimized their respective processes. Baro et al. found that the temperature range of 20-25°C is optimal for their process, while Palmer et al. found that the temperature range of 50-70°C is optimal for their process. Why would one of ordinary skill in the art try to optimize a process when Baro et al.

and Palmer et al. have already found the optimal temperatures for their respective processes? One of ordinary skill in the art, reading Baro et al. and Palmer et al. would not have tried to optimize the reaction temperature of that parameter has already been given by Baro et al. or Palmer et al. Thus, a person of ordinary skill in the art would select a temperature range of 20-25°C, if he is using extraction to purify the product (as taught by Baro et al.). On the other hand, he would use a temperature range of 50-70°C, if he is using distillation to purify the product (as taught by Palmer et al.). Short of improper hindsight, there is no rationale for one of ordinary skill in the art to use the temperature range of 40-45°C, as Baro et al and Palmer et al. have already taught optimal temperature ranges for their respective processes.

In fact, the cited references actually teach away from the reaction temperature of the present invention. As discussed above, Baro et al. disclose a reaction temperature of 20-25°C (Example 1), while Palmer et al. disclose a reaction temperature at 50-70°C (column 2, lines 42-43; and column 3, Working Example). Neither of these ranges encompasses the present temperature range of 40-45°C. Baro et al. disclose a low temperature range while Palmer et al. disclose a high temperature range. This is clearly contrary to the present invention, as Applicant has discovered an intermediate range that, when combined with the appropriate washing pH, achieves better yield and purity of the epoxy intermediate. One of ordinary skill in the art reading the cited references would not have any rationale to modify the reaction temperatures that are taught by Baro et al. and Palmer et al.

With regard to the extracting and washing at a pH of 7.0-8.0, the Examiner alleges that 1) Baro et al. disclose extraction; and 2) “it is reasonable to assume that water being a well known extraction solvent would produce an extraction step at a pH of 7-8.” Applicants respectfully submit that, as previously explained to the Examiner, the pH recited in the claim refers to the pH

of the organic mass (the organic mass refers to the organic phase mixed with the washing water) or the pH of the resulting water coming out after washing, which is critical for attaining purity, not the pH of the pure water. The pH of the water during and after washing will be obviously different from the initial pH of 7.0, because it contains dissolved materials such as unused base or reactants, and water soluble impurities/by-products present in the reaction mass. The higher degree of purity (even better than Palmer et al.'s) is achieved in the present invention by repeated washings of the unused base or other impurities present in the reaction mass, which is not taught in the cited references as the same pH of the organic mass (not of the pure water) was not achieved or disclosed. This fact is clearly evident from the inevitable distillation of the product (epoxy-intermediate) in Palmer et al., because if the same degree of purity was achieved in Palmer et al. just by water washing, the distillation of the product would not be required.

Additionally, the recited temperature and pH range are not obvious from the teachings of Baro et al. and Palmer et al. because applicant has unexpectedly discovered a critical range of reaction temperatures and washing pH (not just the water pH) that leads to higher yield and purity when compared to the prior art. Referring to the Mehra Declaration filed March 22, 2006, the operating temperature of the reaction (40-45°C) provides a near complete conversion of the phenol compound into essentially the epoxide intermediate. On the contrary, the Baro et al. process being operated at a lower temperature (25°C), yields two products, 3-[4-(2-methoxyethyl)phenoxy]-1,2-epoxypropane intermediate and the corresponding chlorohydrin intermediate (column 2, lines 55-57), having different reactivity patterns in the next step at different conditions. Likewise, Palmer et al. requires distillation to reach 98% purity (column 3, lines 20-23).

The goal of the present invention is to provide highly pure epoxy-intermediate without requiring energy intensive distillation. This is achieved by performing the reaction at 40-45°C and washing the product at a specific pH with water. The advantages resulting from combining these two variables (as recounted in the Mehra Declaration) are unexpected and would not have been obvious to a person of ordinary skilled in the art.

The Examiner alleges that these “advantages are not reflected by the claims.” *See* Office Action, page 3. Applicants respectfully submit that these advantages are the result of the combination of performing the reaction at 40-45°C and washing the product at a pH 7-8 with water. These steps are recited by the claims. The present claims are method claims which recite the steps to perform that method which naturally results in the advantages discussed above and in the Mehra Declaration.

The Examiner also alleges that “the instant invention avoids the using [*sic*] of an excess amount of isopropyl amine,” but no direct comparison is provided. Applicants respectfully submit that the main advantage of the present invention is the purity of the epoxide intermediate, not avoiding an excess amount of isopropyl amine. Direct comparison is available between Example 1 of Baro et al. and Example 1 of the present invention. In Baro et al. method, the purity of the epoxide is 75-80% (*see* Example 1 of Baro et al.); in the present method, the purity of the epoxide is 97-99% (*see* page 5, Example 1, Step 1, of the present specification). This improved purity is significant and unexpected from the disclosure of the cited references or the prior art in general.

Therefore, for the reasons noted, the cited references do not render the present invention obvious within the meaning of 35 U.S.C. § 103. Accordingly, Applicants respectfully request withdrawal of the rejection.

CONCLUSION

Applicant has responded to the Office Action mailed June 27, 2008. All pending claims are now believed to be allowable and favorable action is respectfully requested.

In the event that there are any questions relating to this Amendment or to the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that the prosecution of this application may be expedited.

Please charge any shortage or credit any overpayment of fees to BLANK ROME LLP, Deposit Account No. 23-2185 (124907-00111). In the event that a petition for an extension of time is required to be submitted herewith and in the event that a separate petition does not accompany this response, Applicant hereby petitions under 37 C.F.R. 1.136(a) for an extension of time.

Any fees due are authorized above.

Respectfully submitted,

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